

Distinguishing Change in the Subsistence and the Material Records: The Interplay of Environment and Culture



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HOW DO WE interrelate different forms of archaeological data, analyzed according to different interpretive frameworks, in the understanding and evaluation of change? More specifically, how do changing dietary practices and observed shifts in the material record relate to one another? Are subsistence choices made according to different criteria and with different aims in mind from those concerning material culture, even if the inducement for change is the same? This paper addresses these issues through examining the Harappan or Indus Valley Civilization. While my argument depends upon understanding subsistence change throughout the course of Harappan Civilization, my particular focus will be upon one crucial period in its later years.

At the beginning of the second millennium B.C., the Harappans shifted from more localized subsistence strategies with different dietary practices to a more standardized system over a large area in northwestern South Asia. At the same time and in the same area, the material and settlement record implies that a centralized, standardized, and well-integrated culture was changing into different localized cultural units with more varied artifactual styles. This example should allow us to examine in a single situation how these two seemingly divergent processes interrelate. The common explanation has been that a dramatic alteration in agricultural practices helped trigger changes in material culture and settlement patterns. Ultimate causes for the evolution of society in the Late Harappan Period may be found in the profound changes going on in the environment—the result of both natural events and human activity. But the shift in material culture and settlement was probably not effected through a radical transformation of the agricultural system. We need to recognize that there may have been different kinds of responses to stress in discrete aspects of Harappan culture.

There are three sections to this paper. First, I present a brief culture history of the study area, its chronology, and the changes occurring in both the material and subsistence records. This is followed by a detailed analysis of the different types of

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changes occurring in the subsistence and material records. Finally, there is a discussion of the underlying causes for the changes seen in these two different systems with regard to the interplay between the shifts in diet and the material culture data.

CULTURE HISTORY

Between 4000 B.C. and 1700 B.C., three temporal periods, Early, Mature, and Late Harappan, can be identified in the northwest portion of South Asia (Kenoyer 1991). In each period, we can detect important shifts in the material and subsistence records.

Regional traditions with distinct artifact styles (such as ceramics) arose out of the Neolithic and lasted between c. 4000 B.C. and c. 2550 B.C. During this Early Harappan Period, many of the features that have become associated with the Harappan Tradition first appeared. Larger settlements typically show enclosing walls, standardized brick size, metallurgy, and some indication of long-distance trade (Kenoyer 1991). The subsistence pattern during this period is highly variable from one area to the next. Communities focused on either winter/spring-harvested (*rabi*) or summer/fall-harvested (*kharif*) systems, depending on which was better suited for their environment (see Table 1). These communities, with distinct artifact styles, intensively farmed nearby areas to satisfy local consumption needs.

A fusion of a number of different cultural groups led to the formation of the Mature Period at about 2550 B.C. Now a civilization with a high degree of cultural integration had emerged (Possehl 1990). During this Period, we encounter the fully developed city complexes housing large populations, with community planning, enclosing walls, and with such characteristics as public architecture, a regular style of houses, a uniform standard of weights and measures, and a form of writing (Jacobson 1986; Kenoyer 1991). While Harappan sites can be found dispersed throughout northern India, Pakistan, and into Afghanistan (Fig. 1), sites without Harappan material remains can also be found scattered throughout this area. Non-Harappan groups persisted into this period and were contemporary with the Mature Harappans.

Subsistence reconstruction for this period is based on botanical and faunal studies, motifs of plants and animals on painted pottery, pictures on seals, and analogies with contemporary subsistence practices. But Mature Harappan agricultural practices, and specifically their changing plant-use strategies, are best understood through the analysis of the actual archaeobotanical record (pollen, seeds, and phytoliths). The database for this period is more extensive and of higher quality than the previous period.

The subsistence system of the Mature Harappan Period consisted of a food-producing economy involving domesticated plants and animals, with some hunting, fishing, and plant gathering. Macrobotanical data from about 30 sites (including the site of Harappa) indicates that Harappans in this period farmed a variety of crop plants. Cereals (wheat, barley, and millets) predominated. Other crops included legumes or pulses (peas, lentils, and gram), oilseed and fiber plants (linseed, mustard, sesame, and cotton), and fruits (melon, date, and grape) (Table 1).¹

But the Harappans did not only use cultivated plants. Wild plants were continuously used throughout this period. There is also diversity among domestic ani-

TABLE 1. CULTIVATED PLANTS USED BY THE HARAPPANS, CROPPING SEASON, AND PERIODS OF USE BASED ON THE ARCHAEOBOTANICAL RECORD

PLANT TAXA	CROPPING SEASON ^a	REGION AND PERIOD ^b		
		EARLY	MATURE	LATE
Cereals				
wheat (<i>Triticum</i>)	W	C	C	C/P
barley (<i>Hordeum</i>)	W	C	C/P	C/P
rice (<i>Oryza</i>)	S	—	P	C/P
millets				
(<i>Sorghum</i>)	S	—	—	C/P
(<i>Eleusine</i>)	S	—	P	C/P
(<i>Setaria</i>)	S	—	P	C/P
(<i>Panicum</i>)	S	P	C/P	C/P
(<i>Paspalum</i>)	S	—	—	P
(<i>Enchinochloa</i>)	S	—	—	P
(<i>Pennisetum</i>)	S	—	—	P
Pulses and vegetables				
peas				
(<i>Pisum</i>)	W	C	C/P	C/P
(<i>Cicer</i>)	W	—	C	C/P
(<i>Lathyrus</i>)	W	C	C/P	C/P
lentils (<i>Lens</i>)	W	C	C/P	C/P
gram				
(<i>Dolichos</i>)	S	—	P	C/P
(<i>Phaseolus</i>)	S	—	P	C/P
(<i>Vigna</i>)	S	—	C/P	C/P
(<i>Medicago</i>)	S	—	P	C/P
Oilseed and fiber				
linseed (<i>Linum</i>)	W	—	C/P	C/P
mustard (<i>Brassica</i>)	W	—	C/P	C/P
sesame (<i>Sesamum</i>)	S	—	C/P	C/P
cotton (<i>Gossypium</i>)	S	C(?)	C	C/P
Fruits				
melon (<i>Cucumis</i>)	S	—	P	C
date (<i>Phoenix</i>)	S	C	C	C
jujube (<i>ziziphus</i>)	W	C/P	C/P	C/P
grape (<i>vitis</i>)	S	C	C	C/P

^aW = winter/spring harvested; S = summer/fall harvested.^bC = core area; P = peripheral area.

mals represented in archaeological assemblages, but emphasis was on cattle over sheep and goats (Meadow 1986). There is some indication that Harappans were broadening plant usage through some interregional borrowing, and extending the cultivation period by multicropping. Yet each region still focused on either winter cultivation (wheat, barley, and lentils) or summer cultivation (millets and gram). While this was a period of cultural integration, it was still a period with considerable variation in the subsistence systems.

The shift from the Mature to the Late Harappan Period, beginning at about 2000 B.C., did not occur at the same time, at the same pace, or in the same way



Fig. 1. Map of Indus Valley Civilization site locations.

in all regions of the Harappan Civilization (Possehl and Raval 1989). This period (lasting to between 1700 B.C. and 1300 B.C.) is associated with a divergence of regional material culture from the standardized and overarching tradition of the Mature Phase. There appears to be an increase in settlements and rise in regional systems that were no longer integrated by a single ideological and economic system (Kenoyer 1991). Although many urban sites were abandoned in this period, it does not mark the end of Harappan culture, in that many attributes of the

Mature Phase persisted into this later period (Kenoyer 1991). What is apparent, regardless of the cause, is that regional stylistic zones comprising the material culture of the Late Harappan Period give an impression of a cultural mosaic that more closely resembles the diversity of the Early Period than the uniformity and overarching tradition of the Mature Period (Possehl 1990).

This process of cultural diversification contrasts with the constant but more gradual change seen in the subsistence system. Existing trends of broadening the plant base and adding more cropping seasons continued. But nearly all the plants that were ever exploited by the Harappans, even in the Late Harappan Period, were available and being used in some region of northwestern South Asia during the Mature Period (Weber 1991, 1992).

When the agricultural system is analyzed regionally in terms of core (sites in the Indus Valley) and periphery (frontier regions like Gujarat and Haryana), an interesting pattern emerges (Weber 1992). The Mature Harappan phase is marked by regional variation, whereas the Late Harappan phase displays greater similarity over the entire area of Harappan influence (Table 1). For example, in the Mature Harappan Phase, the core area's agricultural system was dominated by wheat and barley, with little or no sign of millets, fruits, or oilseed. In contrast, archaeobotanical finds in the periphery are mostly made up of millets and legumes. By the Late Harappan Period, multicropping was occurring in all regions, with both summer and winter cultivation incorporated into the subsistence strategy. However, we do see settlements in different regions emphasizing one season of cultivation over another, according to local environmental and climatic conditions.

THE PROCESS OF CHANGE: THE DIFFERENCE IN SUBSISTENCE AND MATERIAL RECORDS

Both the settlement system and material culture in the northwestern portion of South Asia evolved greatly from the first settled villages nearly 9000 years ago. There is little disagreement that the centralized and standardized culture of the Mature Harappans became decentralized and localized by the end of the third millennium B.C. What is less well understood is what politicoeconomic transformations accompanied this shift.

Likewise, there is no doubt that subsistence systems, and agricultural practices in particular, have been considerably altered from the time of their introduction. Over time, settlements became more and more committed to agriculture for meeting their subsistence needs. As more seasons of agricultural labor were added, so plants that flourished in these seasons were utilized (Jarrige 1985; Meadow 1989; Weber 1992).

Yet, the subsistence history of the Harappans displays a pattern that is in complete contrast to that seen over time in the material culture of the Harappan Tradition, in which a period of standardization is positioned between periods of greater regional diversity. This contrast in patterns can be conceptualized in the following manner. Looking first at material culture, there is a gradual, then increasingly rapid increase in urbanization and more standardized traditions climaxing with the Mature Period, followed by deurbanization and an increase in localized expressions of material culture. By contrast, the subsistence system, specifically the agricultural system, displays minor fluctuations throughout. Changes in sub-

sistence were occurring constantly as sharp increments to the repertoire of techniques and species available to populations throughout the region, tending gradually toward almost year-long cultivation and a broadening of the subsistence base over time. By the first millennium B.C., the crop complexes came to resemble those that appear today. While the plant-use pattern was becoming more similar across space, the material culture record shows periods of regional diversity before and after a short period of standardization.

THE UNDERLYING CAUSES FOR CHANGE: THE INTERPLAY AMONG DIET, MATERIAL CULTURE, AND ENVIRONMENT

At issue is how we interrelate the material and settlement record with the subsistence data. The shift toward more localized stylistic attributes and away from urban complexes at the end of the third millennium B.C. is a good case in point. This change is often described as being closely associated with, or even stimulated by, a revolution in agricultural resources and techniques (Jarrige 1985; Possehl 1986; Meadow 1991). If this hypothesis is correct, then we should expect the cultural diversity of the Late Phase to be mirrored by regionally distinct subsistence systems; new plants that opened up areas for exploitation had muted impact elsewhere.

What I propose instead is that what happened in the peripheral sites was no different from what happened in other parts of the Harappan culture area. All areas were involved in the same long-term trends toward more cropping seasons and a broad plant base that I have already cited.

Several factors have been invoked to account for the shift from a more integrative and regional system to a more decentralized and localized one. Some would have been natural events; others would have stemmed from human action. Sedimentation and tectonic movements more than likely impacted the Ghaggar-Hakara river system to the degree that the "ancient" Saraswati stopped flowing. This would obviously have dealt a serious blow to cultivation and hence food production (Misra 1984; Misra and Rajguru 1989; Kenoyer 1991). In addition to this event, the Indus River appears to have shifted further to the east (Flam 1981, 1991), and there was a possible increase in the amount of rain occurring in the summer months (Kenoyer 1991; Weber 1991). Humans also made their mark on the environment through herding, deforestation, and intensive agriculture (Misra 1984; Weber 1991). Paleoethnobotanical analysis from sites throughout this region clearly shows changes in vegetation that were the result of human behavior, for example, a rise in the density and quantity of weedy species (Weber 1991). This suggests increased disturbance to the land. Any one of these factors, or some in combination, would have disrupted the production and distribution of food, since all involved disturbance to the environment. Presumably, in response, people moved away from the large urban centers and into a system of smaller, more dispersed settlements.

These ecological events did not significantly alter what was being cultivated or the agricultural techniques used. Perhaps the greater change involved how food was distributed rather than the way it was produced. It may be that with increased dependence on both winter and summer crops, many communities had the ability to become self-sufficient. Alternatively, population growth outside the

urban core in areas well suited for multicropping meant that more food stayed in the locality. Subsistence studies can only give a partial answer to this question, and the remainder must come from analysis of the political situation. Did local communities feel less of a need to remain connected to larger urban centers? Was there a breakdown in the system of surplus extraction operated by elites in the cities?

A possible scenario for the evolution of Harappan agricultural practices may be as follows. During the Early Harappan Period, where we see regional variation in the material culture, the agricultural systems also showed a lot of variation. During this time, in areas where the soil and climate were less favorable to the winter cultivation of wheat and barley, people began growing a variety of hardy summer-cropped plants that included a variety of local millets. In the Mature Harappan Period, when extensive trading and colonization helped bring about sociopolitical integration, the subsistence system remained much the same. The only difference was that there was some sharing of crops, and some communities practiced both summer and winter cultivation. Though the beginning of multicropping is evident during this period, as a whole the subsistence system remained much the same in that the primary crop remained the one best suited for that particular environment, with the same cereal grains dominating the archaeobotanical record.

The Late Harappan settlements, many of which were established along the newly stabilized river systems, were based on an existing subsistence strategy in which agriculture was increasingly important. In fact, as multicropping became more common, the agricultural system appeared more uniform throughout the region of the Harappan Civilization (Weber 1992), including wheat, barley, oats, pea, lentil, chickpea, linseed, jujube, and brown mustard being cropped in the winter and rice, millets, grape, cotton, date, hyacinth bean, and horse, black, and green gram in the summer (Costantini 1981, 1990; Kajale 1991; Weber 1991). More cropping seasons were added using species already available somewhere within this region. Although the emphasis on certain plants changed over time, no plant disappears from the record, implying that whatever the Harappans acquired, they kept in their dietary repertoire.

This trend may reflect a style of decision making particularly suited to matters of subsistence, in that once a plant is added to the core subsistence repertoire, especially in marginal environments that abound in South Asia, it is unlikely to be removed. People were reluctant to stop cultivating a useful plant, even if it was less important to them over time. In the production of their artifacts and architecture, on the other hand, people probably do not demonstrate the same broadening and diversifying strategies. Though all Harappan change should be viewed together with ecology, in this case, many dimensions of material culture enjoy greater autonomy relative to the environment, and change may appear dramatic compared to the cautious, incremental use of resources and techniques in the subsistence system.

Thus, while it may be true that large city complexes gave way to smaller farming settlements, and that there was a localization of artifact styles sometime between the third and second millennia B.C., subsistence change was simply a continuation of efforts to increase yield in a more agriculturally based society. Environmental shifts were impacting both the subsistence and the sociopolitical system of the Harappans. Yet, the agricultural system became more uniform and began to

resemble the pattern seen in much of South Asia today, whereas the material culture and settlement systems became more localized and less standardized and centralized.

NOTES

1. The summary presented here is derived from a more complete discussion and interpretation of Harappan plant-use patterns in Weber (1991, 1992).

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ABSTRACT

By the end of the second millennium B.C., localized subsistence strategies with different dietary practices had shifted to a more standardized system over a large area in northwestern South Asia. At the same time and in the same area, the material and settlement record implies that the centralized and well-integrated culture of the Indus Civilization was breaking down into a less integrated system with a greater emphasis on local cultural units. How do these processes interrelate? Some answers may come from analyzing the environmental limitations of this area, changes in the pattern of species being exploited, and the impact of humans on their habitat over time.